

The Impact of Real-Time Biofeedback on Partial Weightbearing Training: A Comparative Study

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INTRODUCTION: Partial Weight Bearing (PWB) is integral to rehabilitation protocols following orthopedic and trauma surgeries. Standard of Care (SOC) for PWB training often involves using a bathroom scale, a method criticized for its inaccuracy. This study aims to compare SOC training in PWB with a biofeedback device.

METHODS: Sixty healthy participants were randomized into SOC or Biofeedback (BF) training groups, practicing 20 kg PWB using a standardized protocol. Gait data, including compliance with weightbearing restrictions (not exceeding 150% of the set weightbearing limit), was monitored using Loadsol insole force sensors. Participant satisfaction and usability were assessed through questionnaires. Training duration and walking speed were also measured.

RESULTS: The BF group's peak force averaged 330 Newtons, significantly lower than the SOC group's 600 Newtons, which exceeded the prescribed limit by over three times ($p \leq 0.001$)(Figure 1). Compliance with weightbearing restrictions was substantially higher in the BF group (88% or 29/33 participants) compared to the SOC group (19% or 5/27 participants) ($p \leq 0.001$)(Figure 1). The BF group also required less training time, averaging $9:00 \pm 3:06$ minutes, versus $12:49 \pm 3:01$ minutes in the SOC group ($p \leq 0.001$). Questionnaire responses showed no significant differences between groups.

DISCUSSION AND CONCLUSION: Biofeedback significantly enhances compliance with weightbearing restrictions in PWB training while reducing the training duration. Based on these findings, we recommend the implementation of biofeedback devices in PWB training post-orthopedic surgery.

Figure 1.

